

HOW • TO • MAKE CONCRETE POSTS

FENCE POSTS, GATE POSTS, CORNER POSTS, WALLS

ONE of the first questions a prospective farm buyer asks is, "Are the fences in good condition?" If they are "all run down" the value of the farm is materially depreciated. It is as important to have good fences as it is to have good buildings.

Keeping the fence in first-class shape is no small matter where the post material used necessitates frequent repairing. Even the best wood posts will burn, rot out, pull out, get out of line, break under heavy strains or wash out during floods. Wood posts are temporary at best, and a fence constructed with them is never paid for. It is in need of repairs after the first year and continues to be a source of trouble and expense as long as it lasts.

Considering the high maintenance cost of wood fences and in view of the scarcity of good post timber, it is no wonder that farmers in every section of the country are rapidly adopting concrete as the material for their fence posts.

The concrete fence post is everlasting. It can be depended upon to resist unusual strains

without breaking. It keeps in perfect alignment and looks better than any other type of post. In some sections it costs no more than a good wood post. And it is cheaper by far than any wood post when long service and freedom from repairs and painting are considered. The first cost of a fence built with concrete posts is the last cost for a life-time.

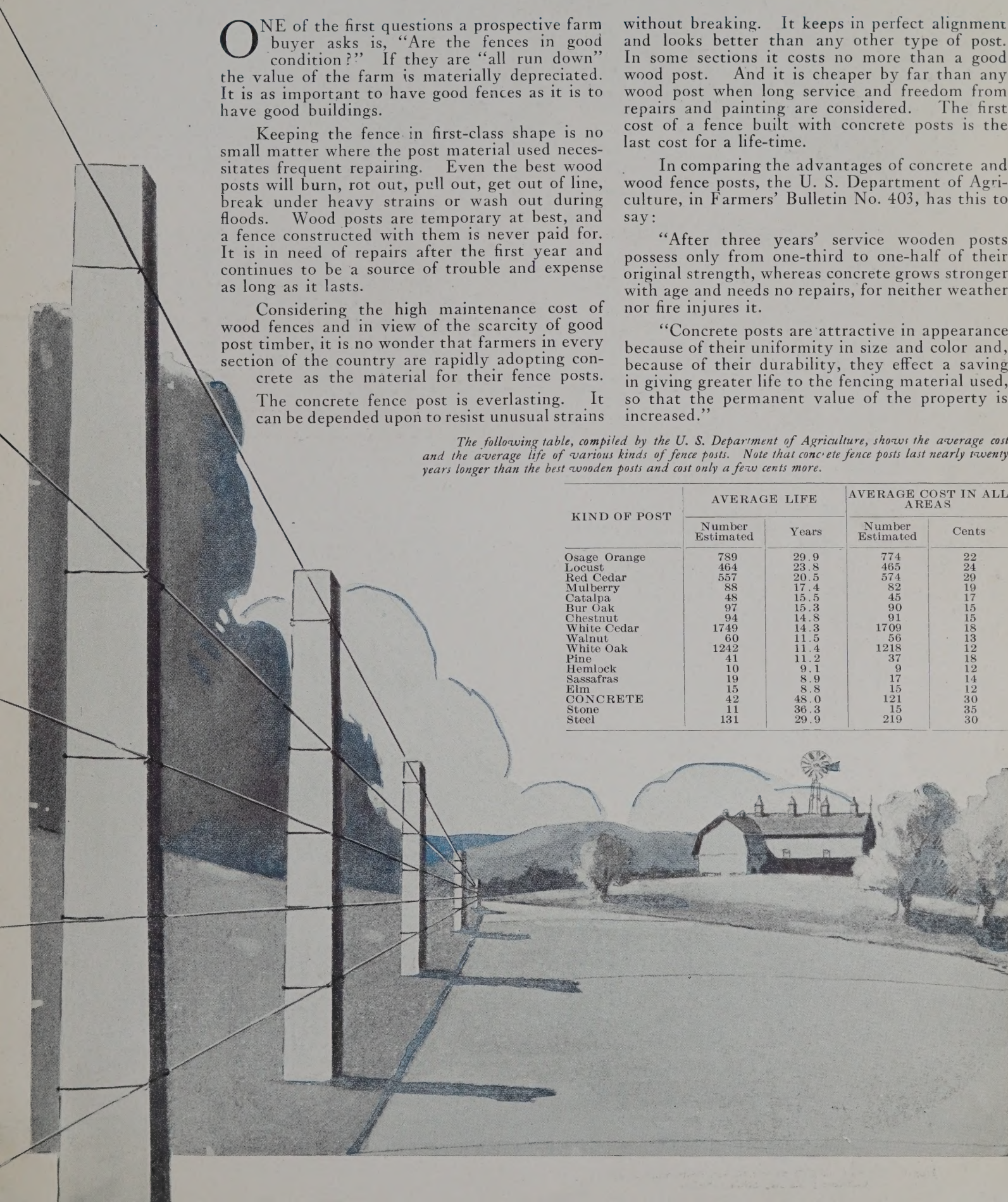
In comparing the advantages of concrete and wood fence posts, the U. S. Department of Agriculture, in Farmers' Bulletin No. 403, has this to say:

"After three years' service wooden posts possess only from one-third to one-half of their original strength, whereas concrete grows stronger with age and needs no repairs, for neither weather nor fire injures it.

"Concrete posts are attractive in appearance because of their uniformity in size and color and, because of their durability, they effect a saving in giving greater life to the fencing material used, so that the permanent value of the property is increased."

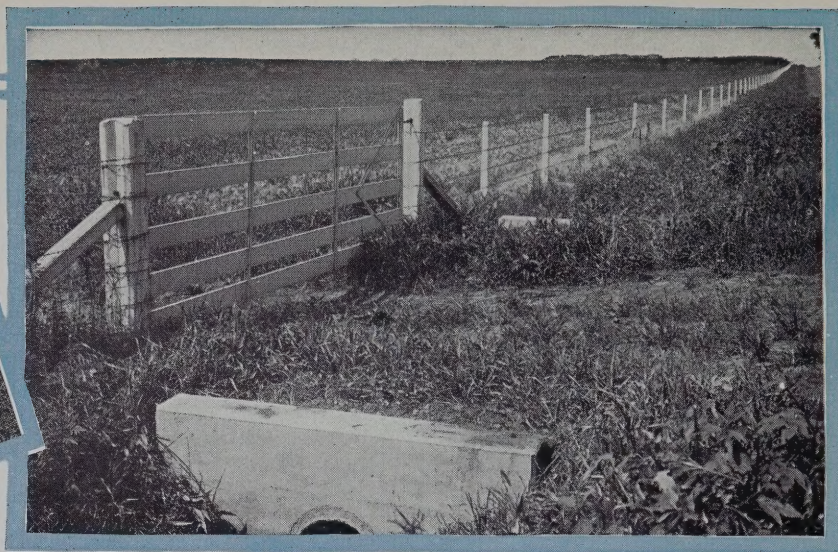
The following table, compiled by the U. S. Department of Agriculture, shows the average cost and the average life of various kinds of fence posts. Note that concrete fence posts last nearly twenty years longer than the best wooden posts and cost only a few cents more.

KIND OF POST	AVERAGE LIFE		AVERAGE COST IN ALL AREAS	
	Number Estimated	Years	Number Estimated	Cents
Osage Orange	789	29.9	774	22
Locust	464	23.8	465	24
Red Cedar	557	20.5	574	29
Mulberry	88	17.4	82	19
Catalpa	48	15.5	45	17
Bur Oak	97	15.3	90	15
Chestnut	94	14.8	91	15
White Cedar	1749	14.3	1709	18
Walnut	60	11.5	56	13
White Oak	1242	11.4	1218	12
Pine	41	11.2	37	18
Hemlock	10	9.1	9	12
Sassafras	19	8.9	17	14
Elm	15	8.8	15	12
CONCRETE	42	48.0	121	30
Stone	11	36.3	15	35
Steel	131	29.9	219	30





Concrete posts
make a good impression
on the prospective farm buyer



The owner of this large farm finds concrete useful for culverts
and other improvements as well as for posts

Molds for Concrete Posts

The size of concrete posts must be governed by the individual requirements of the maker. The character of the soil and the probable strains that the fence will be called upon to stand are the two deciding features. For ordinary fencing purposes no post should be used that is smaller than 3 inches square at the top, $4\frac{1}{2}$ inches square at the bottom and seven feet long.

Concrete line posts are made in various shapes—rectangular posts without taper, rectangular posts tapering on two sides, rectangular posts tapering on four sides, and triangular posts. Molds for the rectangular post without taper are by far the easiest and cheapest to make. It is economical to construct such molds in “gangs” or “sets” with continuous bottom and end pieces.

Figure 1 on the blueprint in the center of this folder shows a “gang” of molds for seven feet line posts $3\frac{1}{2}$ ”x5” in cross section without taper. The bottom is of “ship lap” nailed to three 2 x 4 stringers. The end pieces are made by nailing $3\frac{1}{2}$ ”x5” blocks to a 1 inch board, leaving 1 inch spaces between the blocks. The 1 inch partition boards slide in between these blocks. The end pieces are hinged to the bottom. Rods with crank nuts at one end are dropped into slots cut in the end pieces. When the partition boards are inserted the crank nuts are tightened. This draws all the pieces together firmly. The slots are centered so that the rods lie against the sides of the outer side pieces, acting as braces for them.

While it is a simple matter to construct satisfactory molds at home, it is often more economical to use patent steel molds where the number of posts to be made warrant the purchase of such molds. Neighbors may club to-

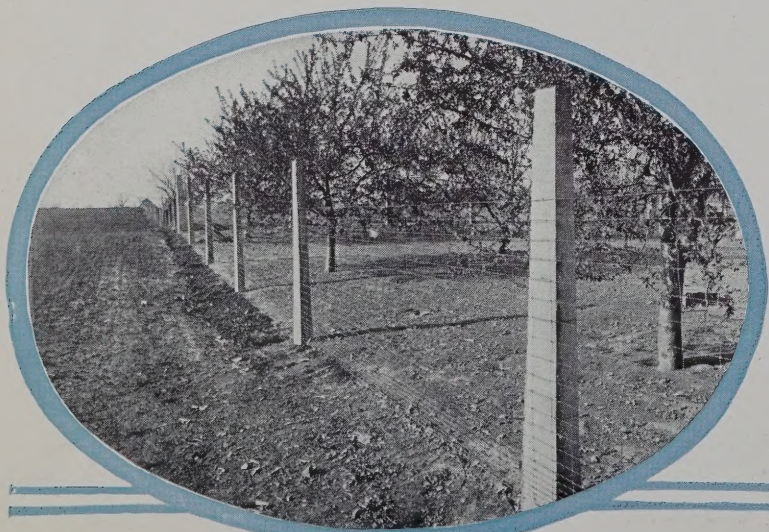
gether to buy steel molds and thus economize in this expense. Steel is lighter and easier to handle than wood and it gives a smoother, neater finish to the concrete post. Patent steel molds of various shapes and sizes may be purchased from any of the following manufacturers:

Albany Hardware Specialty Co.	Albany, Wis.
American Cement Machinery Co.	Keokuk, Iowa
Archer Iron Works	Chicago
Associated Manufacturing Co.	Waterloo, Iowa
Atlas Engineering Co.	Milwaukee, Wis.
Badger Concrete Mixer & Machinery Co.	Milwaukee, Wis.
Blystone Batch Mixer Co.	Cambridge Springs, Pa.
Cement Tile Machinery Co.	Waterloo, Iowa
Chain Belt Co.	Milwaukee, Wis.
Chicago Builders Specialties Co.	Chicago
W. E. Dunn Manufacturing Co.	Holland, Mich.
Excelsior Mixer & Machinery Co.	Milwaukee, Wis.
Ideal Concrete Machinery Co.	Cincinnati, Ohio
Iowa Foundry & Manufacturing Co.	Ft. Dodge, Iowa
Jaeger Machine Co.	Columbus, Ohio
Koehring Machine Co.	Milwaukee, Wis.
Lansing Company	Lansing, Mich.
Milwaukee Concrete Mixer & Machinery Co.	Chicago
Municipal Eng. & Contracting Co.	Chicago
National Mixer Co.	Oshkosh, Wis.
Northfield Iron Co.	Northfield, Minn.
Northwestern Steel & Iron Works	Eau Claire, Wis.
Raber & Lang Manufacturing Co.	Kendallville, Ind.
Ransome Concrete Machinery Co.	Chicago
Republic Iron Works	Tecumseh, Mich.
George T. Sheldon	Nehawka, Neb.
Sioux City Engineering & Machinery Co.	Sioux City, Iowa
T. L. Smith Co.	Milwaukee, Wis.
Standard Scale & Supply Co.	Chicago
Sterling Machinery Co.	La Crosse, Wis.
Chas. H. Stehling Co.	Milwaukee, Wis.
Turner Manufacturing Co.	Port Washington, Wis.
Waterloo Cement Machinery Co.	Waterloo, Iowa

Reinforcing Concrete Posts

Concrete is strong, but it lacks elasticity. To get the best results, therefore, it is necessary to combine the strength of concrete with the toughness and elasticity of steel. This is done by imbedding steel rods in the concrete. Strains which tend to bend or stretch the concrete are taken up by this steel reinforcing.

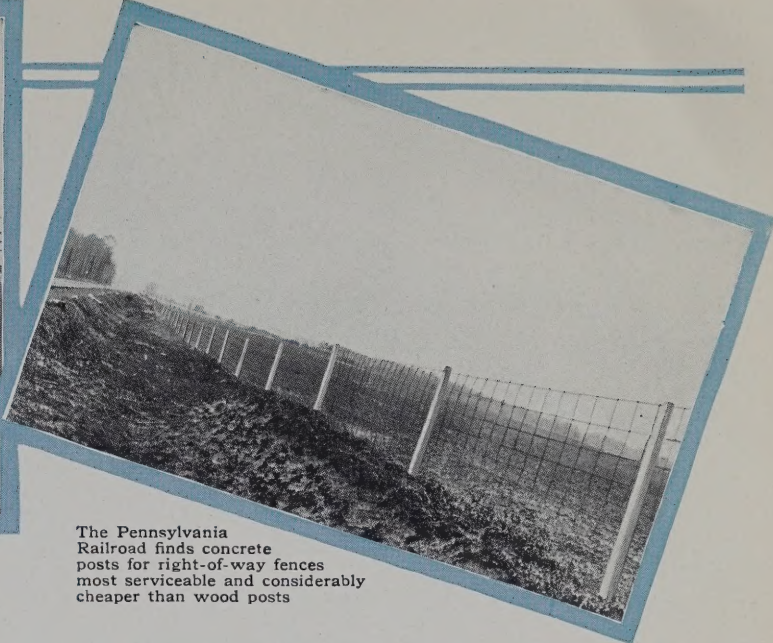
The most important point to remember in reinforcing concrete posts is that strains may come from any direction when the post is in the fence line. The reinforcing must, therefore, be placed so that it will strengthen all sides of the post. One big rod in the center of the post will not do. In posts of rectangular cross section four rods should be used—one in each corner of the post about $\frac{3}{4}$ ” to 1” from the surface. The size of these rods depends upon the dimensions of the post. Ordinarily rods



Hog-proof wire is of little value after the posts work loose
Concrete posts stay strong always



Concrete posts used to support wood fence alongside the Pennsylvania Railroad tracks



The Pennsylvania Railroad finds concrete posts for right-of-way fences most serviceable and considerably cheaper than wood posts

$\frac{3}{16}$ " to $\frac{5}{16}$ " in diameter will suffice. Figure 2 on the blueprint shows the proper position for reinforcing rods in posts of various shapes.

Wire of the proper size may be used for reinforcing, but owing to the inconvenience of handling such material it generally will be found more economical to use rods.

As it is important that the reinforcing remain in proper position while the concrete is being placed, wire spacers are used. Spacers are made by twisting a piece of No. 16 wire as shown in Figure 3 on the blueprint. The loops fit over the reinforcing rods and hold them in their relative positions. Three or four of these spacers are used on each rod. Figure 4 shows how the spacers are used. Note also in this figure that the ends of the reinforcing rods are turned back about one inch.

Molding Concrete Posts

The molds should be oiled or soaped before the concrete is placed, as concrete has a tendency to adhere to wood or steel. Wooden molds should be well soaked in water before they are used. Otherwise they may swell when the concrete is in place and thus crack the posts.

The concrete should be mixed in accordance with directions on the last page of this folder. Only such quantity as can be used immediately should be mixed at one time.

If any concrete stands for thirty minutes or longer after mixing, it should not be used.

After the molds are filled to a depth of $\frac{3}{4}$ " to 1", two reinforcement rods, properly spaced, are laid in. The molds are then filled to within $\frac{3}{4}$ " to 1" of the top, when the remaining reinforcing is placed. They are then filled to the top.

As soon as the molds are filled, they should be tapped or moved up and down quickly from the corners. This will release air bubbles and make the concrete more compact.

The exposed corners of the post may be bevelled off with an edger and the open face given a smooth finish with a trowel immediately after the surface water has been absorbed and before the concrete has become too hard.

Curing Concrete Posts

Curing a concrete post is as important as any of the other processes. After the concrete has been placed it should be left in the mold for two or three days until

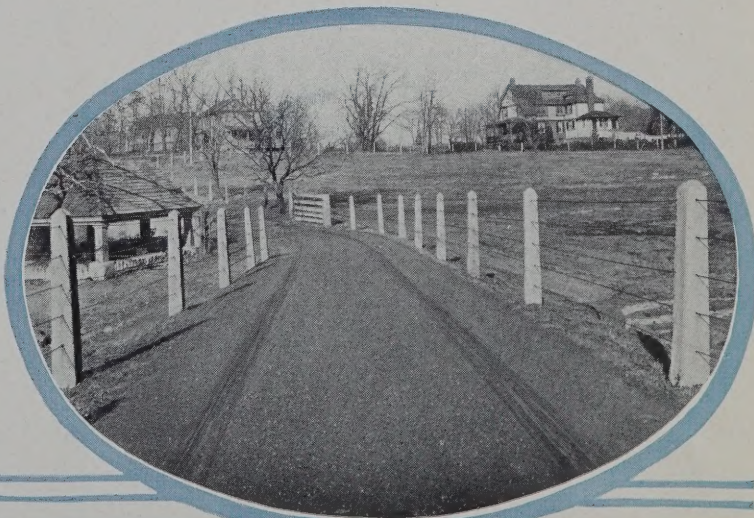
thoroughly hardened. The end pieces and partitions of the mold may then be removed and used on another bottom, but the posts must stay on the bottom board in the shade undisturbed for at least a week or ten days. They should be covered with canvas, burlap, straw or chaff and kept wet by daily sprinkling during this time.

Care should be taken to protect "green" posts from drying winds and sunlight. No attempt should be made to store them out of doors until they are thoroughly seasoned. After the tenth day they may be moved outdoors and piled on end in the same manner wooden posts are piled. Great care should be exercised in handling the posts at this stage. A drop of 6 inches may break a "green" post. Jarring may cause cracks which, though invisible, will seriously weaken the finished post.

A post may be used after it is thirty days old, but the longer it is allowed to stand the stronger it will be, for concrete gains strength during the first year. Some farmers make their posts long enough in advance to allow them three months for seasoning before they are used.

Attaching Wires

There are many methods of attaching wires to line posts. Some makers imbed staples in the fresh concrete. Others insert wooden pegs in the posts and nail the wires to the pegs. Some make holes in the posts and pass the wires through. But it has been found that the most satisfactory way is to tie the wires to the post by means of wires passed around the post and twisted to the line wires as illustrated in Figure 5. This is the easiest and cheapest way and has proven entirely satisfactory.



Concrete fence posts at Haverford College Haverford, Pa.

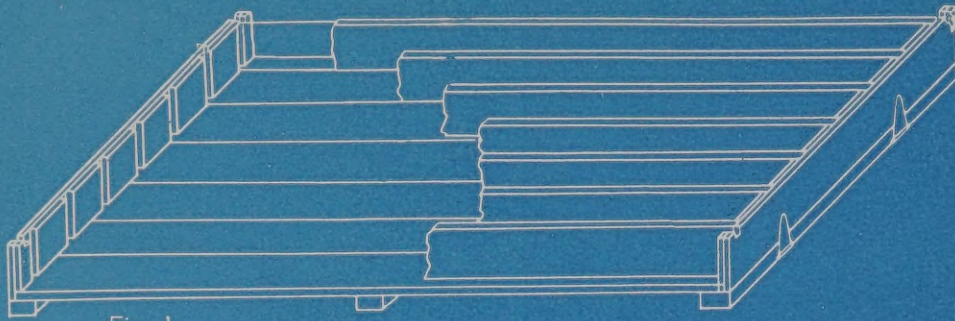


Fig. 1.
Gang mold for Concrete fence posts without taper



Fig. 2.
Proper position for reinforcing rods in various types of concrete fence posts

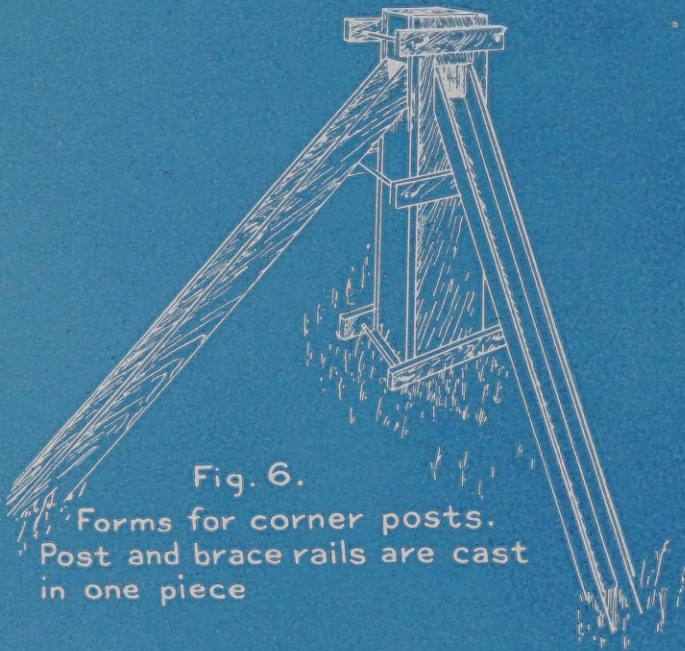


Fig. 6.
Forms for corner posts.
Post and brace rails are cast
in one piece

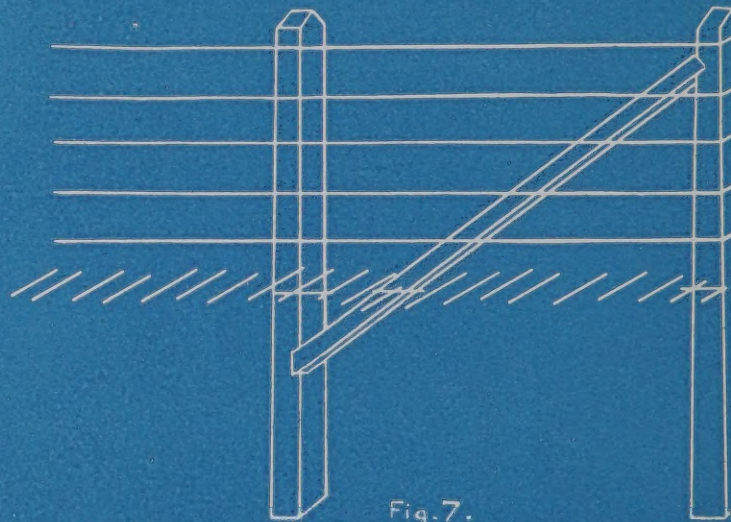


Fig. 7.
One method of bracing corner posts. Mortar
brace posts. Concrete brace rails are inserted

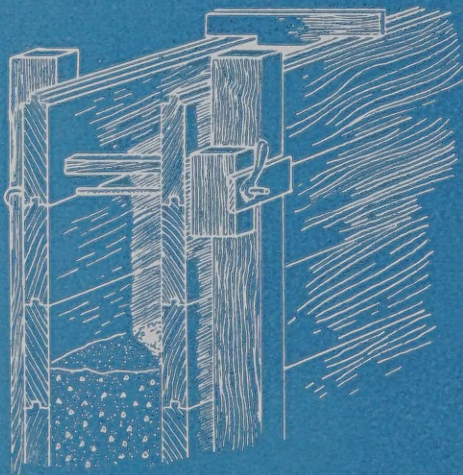


Fig. 10.
The rod and clamp method of
holding wall forms in place

DETAILS SHOWING
CONCRETE POSTS
ALPHA PORTLAND
EAST



Fig. 3.
Wire spacer used for holding
reinforcing rods in place.

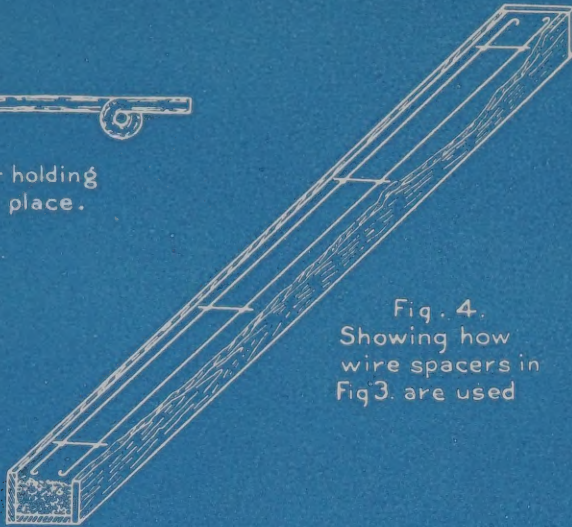


Fig. 4.
Showing how
wire spacers in
Fig. 3. are used

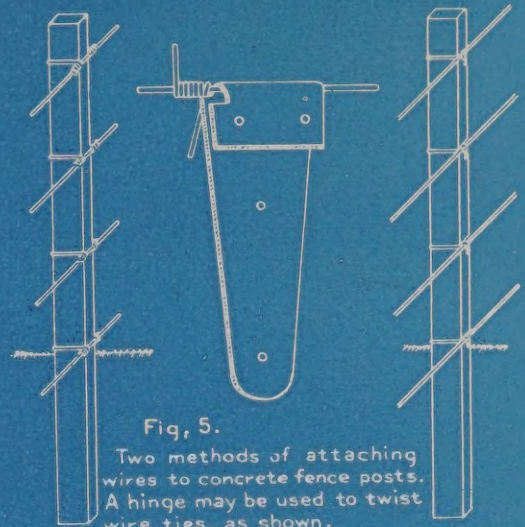


Fig. 5.
Two methods of attaching
wires to concrete fence posts.
A hinge may be used to twist
wire ties, as shown.

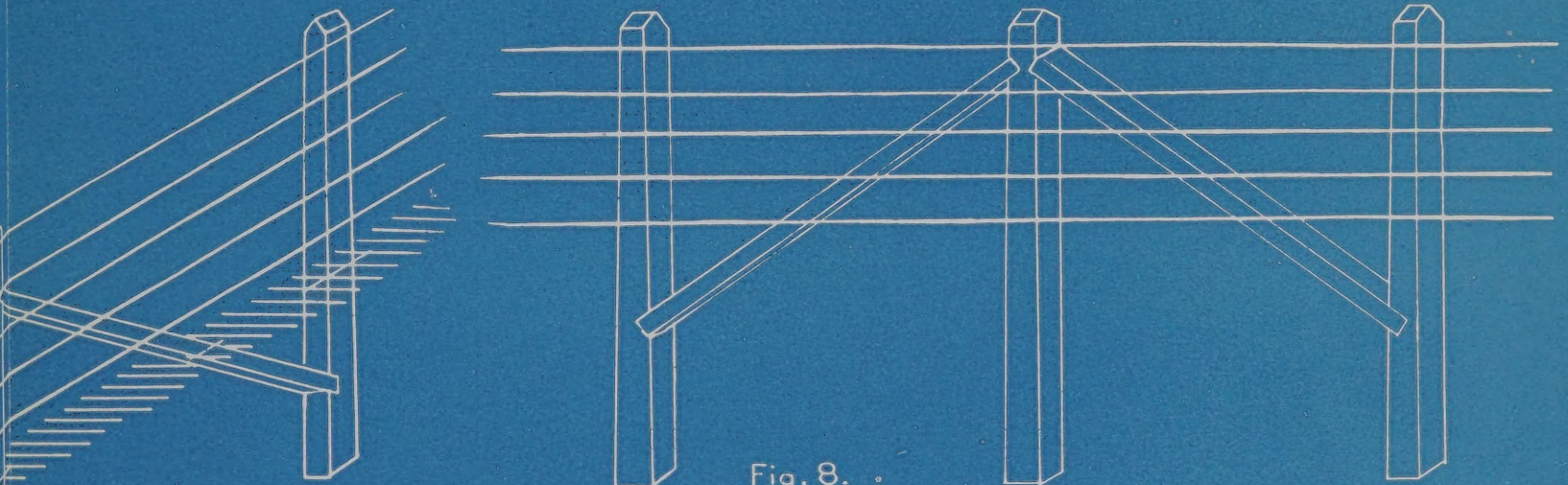


Fig. 8.

Method of bracing fence line every thirty posts.
Principle is same as in Fig. 7.

es are cast in corner and
ed in mortises as shown.

CONSTRUCTION OF
and INCLOSURE WALLS
CEMENT COMPANY
ON, PA.

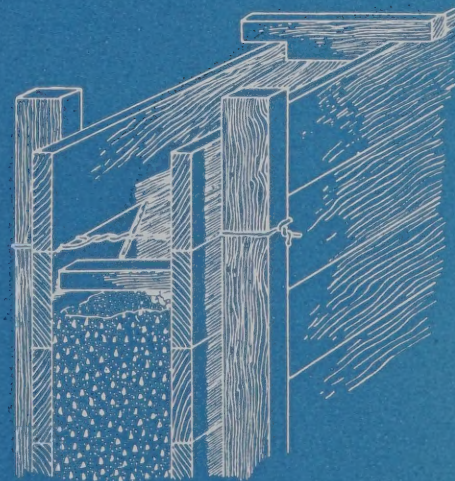
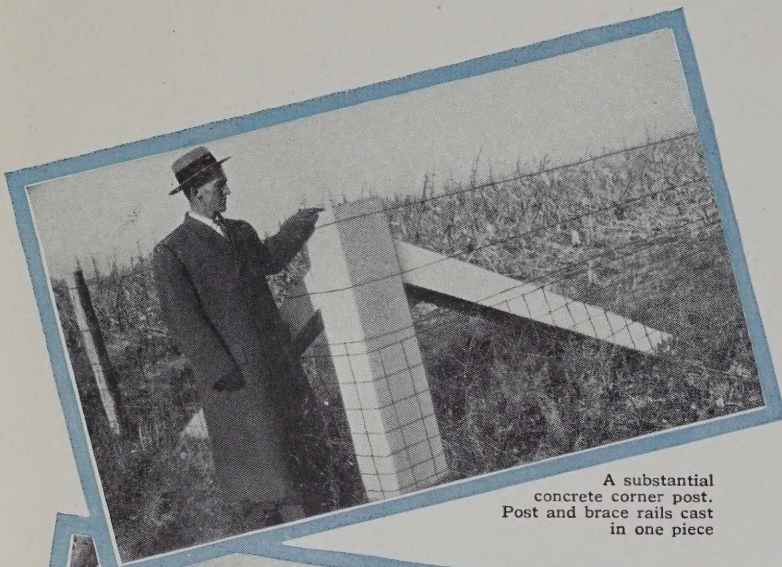


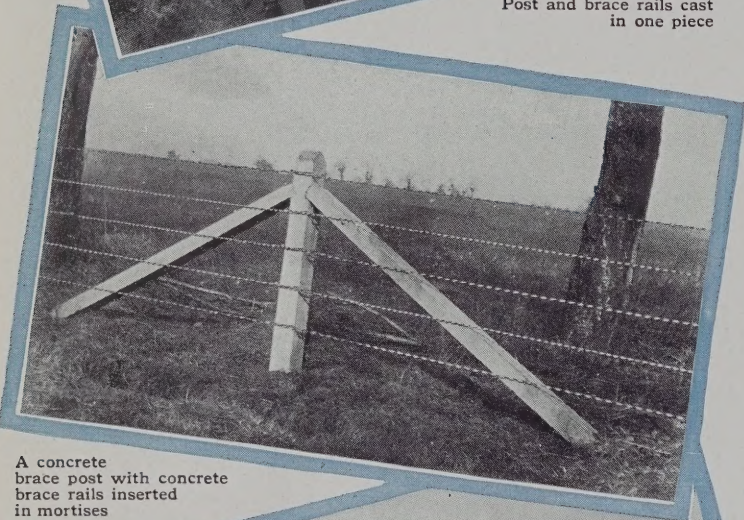
Fig 9.

A common method of spacing
and tying forms for concrete walls.

Concrete Corner Posts



A substantial concrete corner post. Post and brace rails cast in one piece

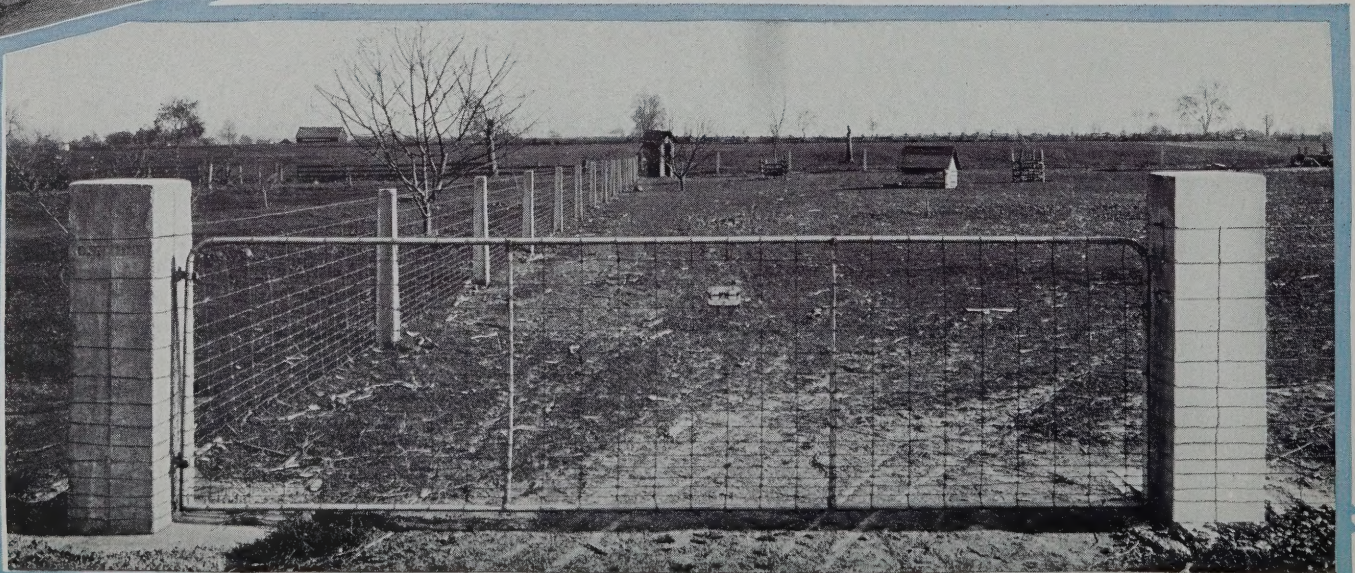


A concrete brace post with concrete brace rails inserted in mortises



Concrete corner posts add years to the life of a wood-post fence

Concrete posts prevent gates from sagging



On account of the severe strains corner posts are required to withstand they must be heavier than ordinary line posts and must be braced properly. They are generally made square without taper. The size is a matter that must be decided upon by the farmer. Corner posts are made in sizes from 6" x 6" to 12" x 12". The size of the reinforcing rods depends upon the size of the post. In a 6 x 6 post four rods $\frac{9}{16}$ " in diameter should be used. In a 12 x 12 post four 1 inch rods are used. On account of their weight and their consequent inconvenience of handling, concrete corner posts larger than 8 inches square are usually cast in place. A hole is dug in the ground and filled to ground level with concrete. Forms are then put in position and filled with concrete. When the soil is not firm it is necessary to use forms for the part that is underground. In the case of the corner post shown in Figure 6, the large base, or underground part, was built up of concrete made of field stone of assorted sizes. In all cases reinforcing rods must extend the full length of the post. If only that part of the post above ground is reinforced it is liable to break off at the ground if subjected to any severe strains.

Bracing corner posts is absolutely necessary unless the post is made so massive that its own weight is sufficient. Corner posts are often made monolithic with their braces. Figure 6 on the blueprint shows a corner post form that is in common use. It must be borne in mind that the braces should be reinforced as well as the post.

Another method of bracing corner posts is to leave notches or mortises about 8 inches or a foot from the top on the sides where the bracing is necessary. Brace rails are cast in molds. One end of the brace rail is inserted in the notch or mortise and the other end inserted in a similar notch made in the bottom of a brace post. Brace posts should be heavier than the line posts. Figure 7 illustrates this method of bracing.

It is a good practice to use a similar method of bracing line posts every thirty posts. Three posts of slightly larger dimensions than line posts are used for this. The notches are made in the same manner as described above. In this case the three posts are in line—not at right angles as in the case of corner posts—and the braces therefore fit in opposite sides of the center brace posts and run parallel along the line of the fence. (See Figure 8.)

Concrete Inclosure Walls

The wood paling fence and similar inclosures are often eyesores. They are continually in need of repairs and painting and go to pieces in a few years. Concrete is not only more attractive in appearance but it is actually cheaper when the cost of repairs and painting is added to the first cost of the wood fence.

Ornamental concrete inclosure walls are becoming more popular every year with countryside dwellers as well as owners of city property. The illustrations on this page suggest a few of the unlimited number of pleasing effects obtainable with concrete.

The underlying principles are the same in nearly all types of concrete walls. An excavation is made deep enough to carry the foundation for the wall below the frost line. This excavation is then filled in with a 6 or 8 inch layer of broken stone, cinders, brickbats or similar materials, and then filled to ground level with concrete.

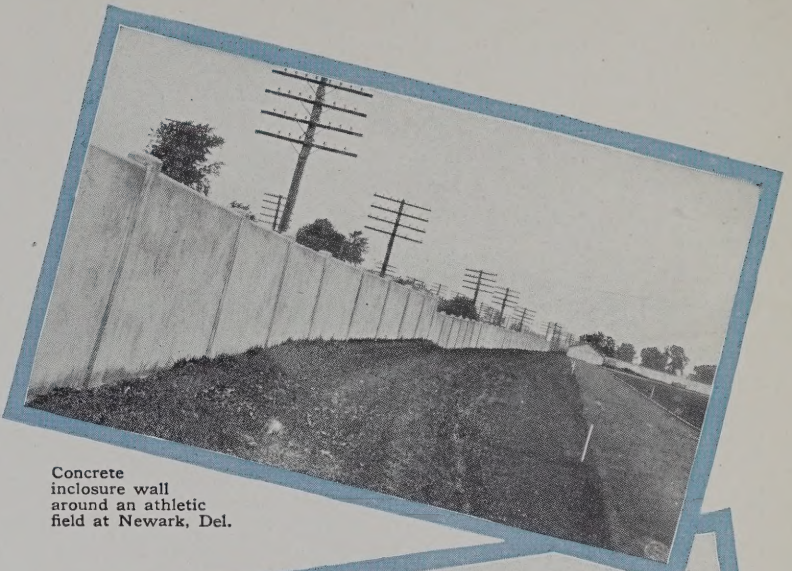
Forms are made of 1 inch material well braced with 2 x 4 studs. These studs should be close enough to prevent bulging of the form boards when the concrete is placed.

While the concrete is being poured the forms are held securely in place by means of wire ties, bolts, wooden strips, etc. Figures 9 and 10 show two ways of holding together and spacing forms.

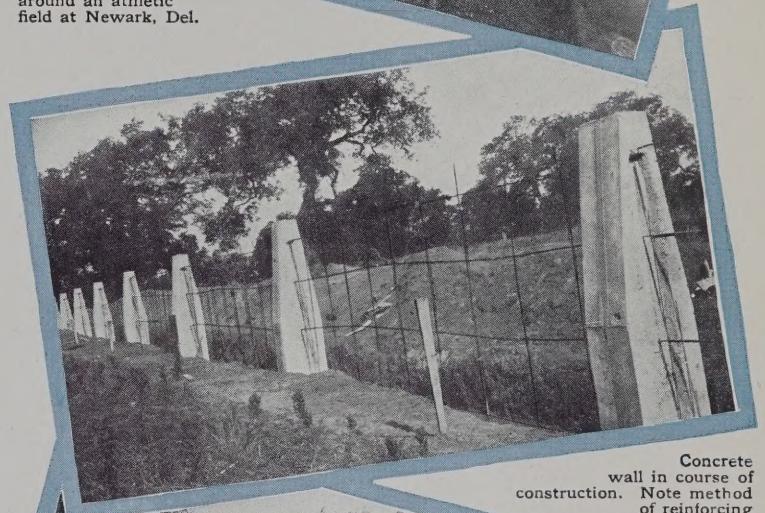
In concrete walls reinforcing rods are generally run horizontally. Sometimes both vertical and horizontal reinforcing is used. The reinforcement should be placed near the center of the wall.

Walls are generally cast in sections. When one section is hard enough, the forms are removed and used for the next section, and so on. In walls where large concrete posts occur at regular intervals, the forms for the wall should be made to take care of a whole section between two of these posts. The posts are cast first and the wall cast in sections, using the same forms for the entire wall. This is done chiefly for the purpose of economizing on lumber.

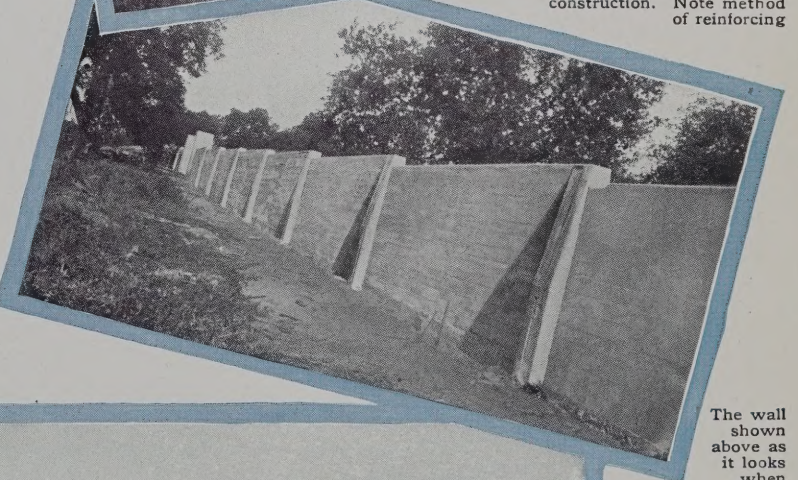
There are many attractive finishes for concrete work now in general use. Any of these can be applied to concrete walls. If an elaborate finish is not desired, it is a good idea at least to scrub the surface with a wire brush to remove the form marks. This should be done before the concrete is too hard.



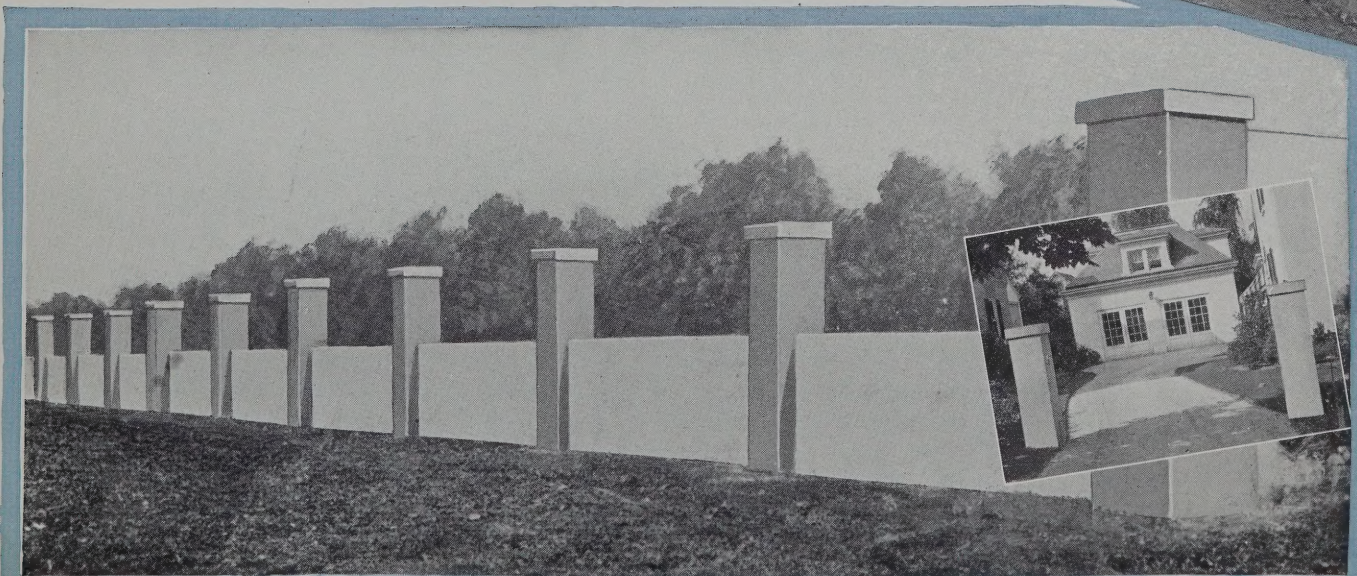
Concrete inclosure wall around an athletic field at Newark, Del.



Concrete wall in course of construction. Note method of reinforcing



The wall shown above as it looks when completed



Concrete wall surrounding a large estate near Buffalo, N.Y. The small illustration shows use of massive concrete posts at entrance to a garage driveway.

Materials and Mixing

For fence posts, light walls, etc. a 1:2:4 concrete mixture will give the best results. This means 1 part cement, 2 parts sand and 4 parts crushed stone, or pebbles. A bottomless box of one cubic foot capacity will be found valuable for proportioning the materials. A bag of ALPHA may be regarded as one cubic foot.

Sand for concrete should be clean—free from vegetable matter and clay—and well graded from coarse to fine. It is a good plan to test the sand by placing a little of it in a bottle filled with water. If after the bottle has been shaken and allowed to stand, there is a sediment on top of the sand equal to more than 5% of the sand, the sand should be washed by playing a garden hose on it.

Crushed stone should be of varying sizes from one fourth of an inch to one inch in diameter. It should be clean, hard and broken with sharp angles. If gravel is used instead of stone it should be screened on a quarter inch screen to remove the sand and small particles and then passed through a 1 inch screen. Gravel should have no rotten stone and should be clean in order that the cement may adhere tightly.

The use of "bank-run" gravel is not recommended because it contains too much sand. It should be screened and mixed in the proper proportions.

In thick walls large stone less than half the diameter of the wall can be used if washed and so placed as to be entirely surrounded by the finer material. In such work a 1:2½:5 mixture will likely give the necessary strength.

The water used in mixing concrete should be clean and free from acids, alkalies or oils. Generally any good tasting water is suitable.

When the amount of concrete work to be done does not warrant the purchase of a concrete mixer, the mixing may be done by hand.

The sand is spread on the mixing platform and covered with a thin layer of cement. The sand and cement are then mixed thoroughly by turning three times dry and twice after water is added. The cement mortar is then spread out in a thin coat on the board and the wet crushed stone or pebbles spread on it. The mortar and stone are then mixed by turning several times.

A good surface can be secured for walls by using smooth forms, by mixing the concrete to a mushy consistency and by "spading" the material as it is placed—that is, forcing the large pieces away from the forms by thrusting a spade or other tool down the outer edge of the mass at frequent intervals.

Concrete can be no better than the materials used. Clean sand, well graded crushed stone or gravel and ALPHA CEMENT make the best kind of concrete—the kind that lasts practically forever.

Maximum binding power and tensile strength are insured by a system of hourly tests by chemists of real authority at every ALPHA plant. Every pound of every bag of ALPHA is *guaranteed* always to meet standard specifications. Look for the guarantee stamp on every new ALPHA bag.

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